



Medical Personnel Working in Health Promoting Hospitals Have Better Physical Activity and Colon Cancer Screening Behaviors

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Abstract

Background Whether health-promoting hospital (HPH) standards improve health-related behaviors among employees remains unclear. This study aimed to investigate whether medical personnel working in certified HPHs have better physical activity and colon cancer screening behaviors than those in non-HPHs.

Methods In 2014, we conducted a cross-sectional questionnaire survey of 43,474 medical personnel working in 104 hospitals (83 HPH and 21 non-HPH) in Taiwan. A generalized linear model and multinomial logistic regression were used to examine the association between HPH status and frequencies of physical activity and colon cancer screening, controlling for socio-demographics and work characteristics.

Results Overall, the participant-reported frequency of physical activity (walking for ≥ 30 min) was 2.34 days (SD = 1.14) in a week; 47.8% participants had never received a fecal occult blood test and 33.2% had received the test ≥ 2 years ago. Medical personnel working in an HPH walked for ≥ 30 min on more days per week ($\beta = 0.05$, 95% CI 0.01–0.08). Working in an HPH was positively associated with receiving a fecal occult blood test (during the past 2 years [OR 2.06, 95% CI 1.87–2.26] and ≥ 2 years ago [OR 1.11, 95% CI 1.01–1.23]).

Conclusions Medical personnel working in an HPH have improved physical activity and colon cancer screening behaviors. However, most personnel do not meet the recommendation of physical activity and colon cancer screening yet.

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Introduction

Medical personnel serve an important role in implementing health promotion in hospitals. In addition to providing holistic care for their patients, medical personnel are actively involved in health-promoting activities and modeling healthy behaviors for their patients (1-3). A systematic review indicated that higher levels of personal physical activity among doctors and nurses were associated with higher physical activity-promoting practices, and that health professionals with positive attitudes toward physical activity were more likely to promote physical activity to their clients (4).

However, medical personnel may not practice sufficient health-promoting behaviors. Loef, van der Beek, Holtermann, Hulsege, van Baarle and Proper (5) analyzed physical activities and found that hospital workers spent more than half

of their leisure and working time in sedentary behavior, followed by standing (26%–38%), and walking (<12%). Taking nursing staff as an example, long work hours may cause a lack of health-promoting lifestyle habits due to insufficient time (6). Shift-work and job stress are barriers to engaging in physical activity among nurses (7). This evidence indicated that the work environment serves a critical role in influencing health behaviors among medical personnel(8).

The World Health Organization (3) asserted that Health Promoting Hospitals (HPHs) have the responsibility to follow the HPH standard of promoting a healthy workplace. HPH standards demand hospital management to support establishment of a healthy and safe workplace, to ensure the availability of developing and maintaining staff awareness on health



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issues, and to support health-promoting activities for staff. HPH standards demand that staff make aware of the health promotion policy. General health-promoting activities in an HPH include staff engagement in health screening and health-related behaviors (3).

The HPH is responsible for enabling and empowering staff to improve their health (2). Increasing healthy behaviors and cancer screening behaviors among hospital staff are important indicators for primary and secondary prevention in hospitals (3). Despite this, whether HPH standards can lead to improve health behavior among employees remains unclear. Description and discussion of the benefits of acquiring and sustaining HPH membership were important priorities of HPH global strategies between 2016 and 2018 (9). There is a need to understand whether HPH initiatives have led to improve health behaviors among employees. This study aimed to investigate whether medical personnel working in certified HPHs have better physical activity and colon cancer screening behaviors than those who work in non-HPHs.

Methods

Design and participants

A national cross-sectional questionnaire survey of full-time staff working in healthcare settings was conducted in 2014. We distributed an anonymized, self-administered, structured questionnaire to full-time staff. The data came from 43,474 medical personnel who worked in 104 hospitals (83 HPH (79.8%) vs 21 (20.2%) non-HPH) in Taiwan. The study ethics were reviewed and approved by the Institutional Review Board at the Bureau of Health Promotion (Taiwan; BHP investigation no. EC1030308-F-W). The study design details were as described previously (10).

Measurements

The study variables included socio-demographics (sex, marital status, educational level, and age), work characteristics (health professions and accredited hospital level), HPH status, and health-related behaviors (physical activity and colon cancer screening).

Physical activity was measured by a question asking how many days a week they spent ≥ 30 min walking or equivalent physical activity based on a 5-point Likert scale (0 day, 1–2 days, 3–4 days, 5–6 days, and 7 days). Colon cancer screening was measured by the question “When was the most recent time that you received a fecal occult blood test?” with the answer options of <2 years, ≥ 2 years, and never.

Data analysis

The study variables were described using frequency, percentages, means, and standard deviations (SDs). The chi-squared test was used to examine whether physical activity and colon cancer screening differed according to HPH status. Multinomial logistic regression was used to examine the association between HPH status (yes or no) and colon cancer screening (<2 years, ≥ 2 years, or never). The generalized linear model was used to examine the association between HPH status and physical activity. We controlled for socio-demographics and work characteristics in the regression models. In all analyses, a two-sided significance level of 0.05 was used. Statistical analyses were performed using IBM SPSS Statistics version 21.0 (IBM Corp., Armonk, New York, USA).

Results

Sample characteristics

The 43,474 medical personnel's characteristics are presented in Table 1. Almost 90% were female, and 58% had an educational level of university or higher. The medical personnel had a mean age of 33.5 (SD = 8.5) years, and most were 26–35 years of age. Most of them were nurses (62.4%), and only few were physicians (4.8%). Over half worked in regional hospitals (53.1%). Almost half of the medical personnel had never received a fecal occult blood test (47.8%); 33.2% reported receiving the test ≥ 2 years previously, and 19% reported receiving the test in the last 2 years. Their average reported frequency of physical activity (walking for ≥ 30 min) was 2.34 (SD = 1.14) in a week, and only 36% reported frequency of more than 3 days.

The chi-squared test showed that sex, marital status, education level, work characteristics, and health behaviors were significantly different between HPH statuses (Table 1). Medical personnel working in HPHs had a higher rate of fecal occult blood tests during the last two years (21.8%), relative to those in non-HPHs (9.6%). More medical personnel in non-HPHs reported having no days of physical activity of ≥ 30 min walking in a week (25.3%) compared to those working in HPHs (24.0%).

Colon cancer screening by fecal occult blood test

The multinomial logistic regression (Table 2) showed that compared to those who had never had a fecal occult blood test, medical personnel who worked in HPHs were more likely to have a test <2 years ago (OR 2.06, 95% CI 1.87–2.26) than those who worked



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Table 1. Study participant characteristics (n=43,474)

Variables	All (n = 43,474)	HPH (n= 32,967)	Non-HPH (n = 10,507)	p-value
	n (%)	n (%)	n (%)	
Sex				0.003
Men	3785 (11.9)	3061 (12.1)	724 (10.8)	
Women	28132 (88.1)	22155 (87.9)	5977 (89.2)	
Marital status				
Married	16662 (43.8)	12545 (43.5)	4117 (44.8)	<.001
Unmarried	16652 (43.8)	13339 (46.2)	3313 (36)	
Divorced/Separated/Widowed	4743 (12.4)	2976 (10.3)	1767 (19.2)	
Educational level				<.001
University or higher	22904 (57.8)	18127 (60.7)	4777 (48.8)	
Vocational school or less	16745 (42.2)	11740 (39.3)	5005 (51.2)	
Age (years)				0.864
≥46	2903 (10.2)	2348 (10.2)	555 (10.4)	
36–45	6903 (24.4)	5627 (24.5)	1276 (24)	
26–35	13415 (47.4)	10879 (47.3)	2536 (47.6)	
<26	5090 (18)	4132 (18)	958 (18)	
Health profession				<.001
Physician	2087 (4.8)	1747 (5.3)	340 (3.2)	
Dentist	1975 (4.5)	1356 (4.1)	619 (5.9)	
Nurse	27108 (62.4)	20631 (62.6)	6477 (61.6)	
Pharmacist	5221 (12)	3670 (11.1)	1551 (14.8)	
Other health professional	7083 (16.3)	5563 (16.9)	1520 (14.5)	
Accredited hospital level				<.001
Medical center	15969 (36.7)	10595 (32.1)	5374 (51.1)	
Regional hospital	23062 (53.1)	18083 (54.9)	4979 (47.4)	
District hospital	4443 (10.2)	4289 (13)	154 (1.5)	
Colon cancer screening				<.001
Never	19030 (47.8)	14717 (47.8)	4313 (47.5)	
≥2 years	13236 (33.2)	9344 (30.4)	3892 (42.9)	
<2 years	7579 (19)	6707 (21.8)	872 (9.6)	
Days of ≥30 min walking in a week				0.048
0 day	10267 (24.3)	7676 (24)	2591 (25.3)	
1–2 days	16799 (39.7)	12823 (40)	3976 (38.8)	
3–4 days	8364 (19.8)	6340 (19.8)	2024 (19.8)	
5–6 days	4138 (9.8)	3157 (9.9)	981 (9.6)	
7 days	2697 (6.4)	2029 (6.3)	668 (6.5)	

Note: Percentages were calculated based on total number of non-missing cases. HPH, health-promoting hospital.



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in non-HPHs. Working in medical centers (OR 1.74, 95% CI 1.62–1.87) or district hospitals (OR 1.67, 95% CI 1.52–1.83), > 26 years of age, and being a physician (OR 1.31, 95% CI 1.12–1.54), a pharmacist (OR 1.14, 95% CI 1–1.3), or other health professionals (OR 1.33, 95% CI 1.22–1.45) were associated with an increased likelihood of having a fecal occult blood test during the last two years, compared to working in regional hospitals, <26 years old, and nurses, respectively.

In terms of having a test ≥ 2 years ago (Table 2), compared to those who had never received a fecal occult blood test, medical personnel who worked in HPHs were more likely to have received the test (OR 1.11, 95% CI 1.01–1.23). Working in medical centers (OR 1.32, 95% CI 1.21–1.43), being divorced, separated, or widowed (OR 1.3, 95% CI 1.02–1.65), having an educational level of university or higher (OR 1.13, 95% CI 1.02–1.24),

>26 years of age, and being a pharmacist (OR 1.2, 95% CI 1.03–1.39) or other health professionals (OR 1.38, 95% CI 1.25–1.52) were more likely to have received that test ≥ 2 years ago, compared to working in regional hospitals, married, vocational school or less, <26 years old, and nurses, respectively.

Physical activity

The generalized linear model for days of ≥ 30 min walking per week was presented in Table 3. The results showed that medical personnel who worked in HPHs had more days of ≥ 30 min walking in a week ($\beta = 0.05$, 95% CI 0.01–0.08). Working in medical centers ($\beta = 0.06$, 95% CI 0.02–0.09), >46 years of age ($\beta = 0.18$, 95% CI 0.12–0.24), and being pharmacists ($\beta = 0.12$, 95% CI 0.06–0.18) or other health professionals ($\beta = 0.2$, 95% CI 0.16–0.24) were associated with

Table 2. Multinomial logistic regression model for colon cancer screening (n=43,474)

Variable	<2 years	≥ 2 years
	Adjusted OR (95% CI)	Adjusted OR (95% CI)
HPH	2.06 (1.87–2.26)**	1.11 (1.01–1.23)*
Sex (Female)	0.91 (0.81–1.01)	0.9 (0.8–1.02)
Marital status		
Unmarried	0.93 (0.87–1.01)	1.06 (0.97–1.15)
Divorced/Separated/Widowed	1.16 (0.95–1.43)	1.3 (1.02–1.65)*
Educational level		
University or higher	1.08 (1–1.17)	1.13 (1.02–1.24)*
Age (years)		
≥ 46	6.37 (5.53–7.33)**	4.7 (3.94–5.61)**
36–45	1.74 (1.55–1.95)**	2.54 (2.2–2.92)**
26–35	1.2 (1.09–1.32)**	1.65 (1.46–1.86)**
Health profession		
Physician	1.31 (1.12–1.54)*	1.19 (0.98–1.44)
Dentist	0.81 (0.57–1.17)	0.77 (0.49–1.21)
Pharmacist	1.14 (1–1.3)*	1.2 (1.03–1.39)*
Other health professional	1.33 (1.22–1.45)**	1.38 (1.25–1.52)**
Accredited hospital level		
Medical center	1.74 (1.62–1.87)**	1.32 (1.21–1.43)**
District hospital	1.67 (1.52–1.83)**	0.98 (0.87–1.1)

Note: $p < 0.05$ *; $p < 0.001$ **; OR = odds ratio; 95% CI = 95% confidence interval.

Reference group was never having colon cancer screening.

Reference for variables were non-HPH, male, married, vocational school or less, age <26 years old, nurses, and regional hospital. HPH, health-promoting hospital.



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more days of ≥ 30 min walking in a week, compared to working in regional hospitals, < 26 years old, and nurses, respectively. Women and married medical personnel had fewer days of ≥ 30 min walking in a week.

Discussion

Our results revealed that medical personnel working in HPHs were more likely to have received colon cancer screening in the last 2 years or ≥ 2 years ago. In addition, medical personnel who worked in HPHs reported more days of ≥ 30 min walking (or equivalent physical activity) in a week compared to those working in non-HPHs. These findings supported HPH initiatives' effectiveness at increasing colon cancer screening and physical activity among medical personnel working in HPHs.

In Taiwan, an HPH is certified based on implementing the five WHO standards for health promotion in hospitals (3). In addition to patients and relatives, the aim is to improve health outcomes among staff. The fourth standard aims to support establishing a healthy and safe workplace and supporting health promotion activities for staff (3). Therefore, medical personnel who work in HPHs may receive more health-promoting activities and resources, which, in turn, facilitates improvement in their health-related behaviors (1). Pelikan, Dietscher, Schmied and R othlin (11) analyzed 35 national/regional HPH networks and found that certified HPH member hospitals widely met the criteria of implementing staff-oriented HPH strategies. Therefore, certified HPHs increase health awareness and capacity among staff, and provide

Table 3. Generalized linear model for days of ≥ 30 min walking per week (n=43, 474)

Variable	Days of ≥ 30 min walking per week	
	Adjusted estimate	95% CI
Certified HPH	0.05*	0.01 to 0.08
Sex (Female)	-0.3 **	-0.35 to -0.25
Marital status		
Unmarried	0.11 **	0.07 to 0.14
Divorced/Separated/Widowed	0.14 *	0.05 to 0.24
Educational level		
University or higher	-0.01	-0.05 to 0.02
Age (years)		
≥ 46	0.18 **	0.12 to 0.24
36-45	-0.04	-0.09 to 0.01
26-35	-0.05*	-0.09 to -0.01
Health professions		
Physicians	0.06	-0.01 to 0.14
Dentists	-0.07	-0.24 to 0.09
Pharmacists	0.12**	0.06 to 0.18
Other health professions	0.2 **	0.16 to 0.24
Accredited hospital level		
Medical center	0.06 *	0.02 to 0.09
District hospital	0.04	-0.001 to 0.08

Note: p < 0.05*; p < 0.001**; 95% CI = 95% confidence interval.

References were non-HPH, male, married, vocational school or less, age < 26 years old, nurses, and regional hospital. HPH, health-promoting hospital



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health-promoting activities for staff (2;3), which may account for the improved health-related behaviors among medical personnel working in HPHs. However, this study included only two health-related behaviors and did not include health outcomes. Further investigation is required to support the HPH initiative's efficacy in improving health outcomes and different health-related behaviors.

Despite the higher frequencies of colon cancer screening and physical activity among medical personnel working in HPHs, the overall rate of the two behaviors did not meet the recommended level. The Healthy People 2020 initiative set the targets for colon cancer screening and aerobic physical activity of at least 150 min/week at 70.5% and 47.9% among adults, respectively (12;13). Previous studies have shown that a lack of time, long work hours, and shift-work were barriers to physical activity (7;14;15) and fecal occult blood tests (16;17). In Taiwan, the average work hours among clinical nurses and physicians was 47.4 h and 59.8 h per week, respectively; $\geq 70\%$ of physicians and nurses worked >48 h and >40 h per week, respectively (10;18). Long work hours and job stress may reduce the time available for health-related behaviors among healthcare workers (6;19).

Effective strategies to increase colon cancer screening include increasing the perceived susceptibility, severity, and benefits in relation to colon cancer (20), using client reminders, providing one-to-one education to encourage and motivate clients, and providing incentives (21). Organizational strategies for increasing physical activity and reducing sedentary behavior in hospital settings include support to use the stairs, establish walking/exercise groups, maintain distance of printers, and hand-out pedometers and set step targets (22-25). Taken together, hospital administration may consider decreasing work hours and job stress, and incorporating the above-mentioned strategies to promote colon cancer screening and physical activity among medical personnel.

Working in medical centers was associated with improved colon cancer screening and physical activity frequency. Medical centers may have more resources and superior systems to conduct health-promoting activities. Of the health professions, pharmacists and other health professionals had better colon cancer screening and physical activity frequencies than nurses. A previous study showed that nurses reported the lowest level of physical activity and stress adaptation of all occupational groups working in hospitals (26).

Colon cancer is the most prevalent cancer in Taiwan and the number of persons with colon cancer has increased

rapidly during the past few years (27). Fecal occult blood test every 1 to 2 years is the most effective measure to decrease colon cancer-associated mortality (28). Though the Taiwan Health Promotion Administration only provided free fecal occult blood test for individuals between 50 through 74 years of age (27), yet recent studies suggested the need of colon cancer screening for younger adults (29-33). Since the expenses for fecal occult blood test was cheap (300 New Taiwan dollars or 9.73 US dollars) and the service was readily available for medical personnel working in hospitals, we decided to include colon cancer screening behavior for medical personnel of all age group in the study. Hospital-based health promotion programs for health professionals is required, with a particular emphasis on nurses.

Bias and Limitations

Since the present study relied on a cross-sectional survey, causal relationships between HPH and health behaviors cannot be established. Physical activity was measured by a single question. In future investigations, more accurate measurements may be used, such as metabolic equivalent values, to increase precision. Since the present study results were based on self-reported questionnaires, incorporating objective indicators could be considered in future studies. Participation to the study was voluntary, therefore, generalizability may be a concern. The study only focused on physical activity and colon cancer screening behaviors, whether HPH is associated with an increase in other health behaviors among medical personnel merit further study. This study was conducted in the context of Taiwan, the results may not be generalizable to other cultural context, thus further study in different country is needed.

Conclusions

The study results indicate that medical personnel working in HPHs have better physical activity and colon cancer screening behaviors than those working in non-HPHs. However, most medical personnel did not have sufficient levels of physical activity or colon cancer screening behaviors. Therefore, hospital-based health-promoting programs for medical personnel are required.

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